

“How Do You Do?”
**Clinical and Functional Outcomes of
West Nile Virus Infection**



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Syndromes Reported as Associated with WNV Infection

Neurologic			Non-Neurologic	
Meningitis	Radiculitis	Myoclonus	Febrile Illness	Pancreatitis
Encephalitis	Plexopathy	Stiff-person syndrome	Hepatitis	Rhabdomyolysis
Poliomyelitis	Cerebellar ataxia	Myasthenia gravis	Chorioretinitis	Vitritis
Bell's palsy	Parkinsonism	Optic neuritis	Rash Illness	Myocarditis
Guillain-Barre-like syndrome	Tremor		Congenital defects	Orchitis

WNV Human Infection “Iceberg”

1 CNS disease case
=
~150 total infections

<1%
CNS
disease

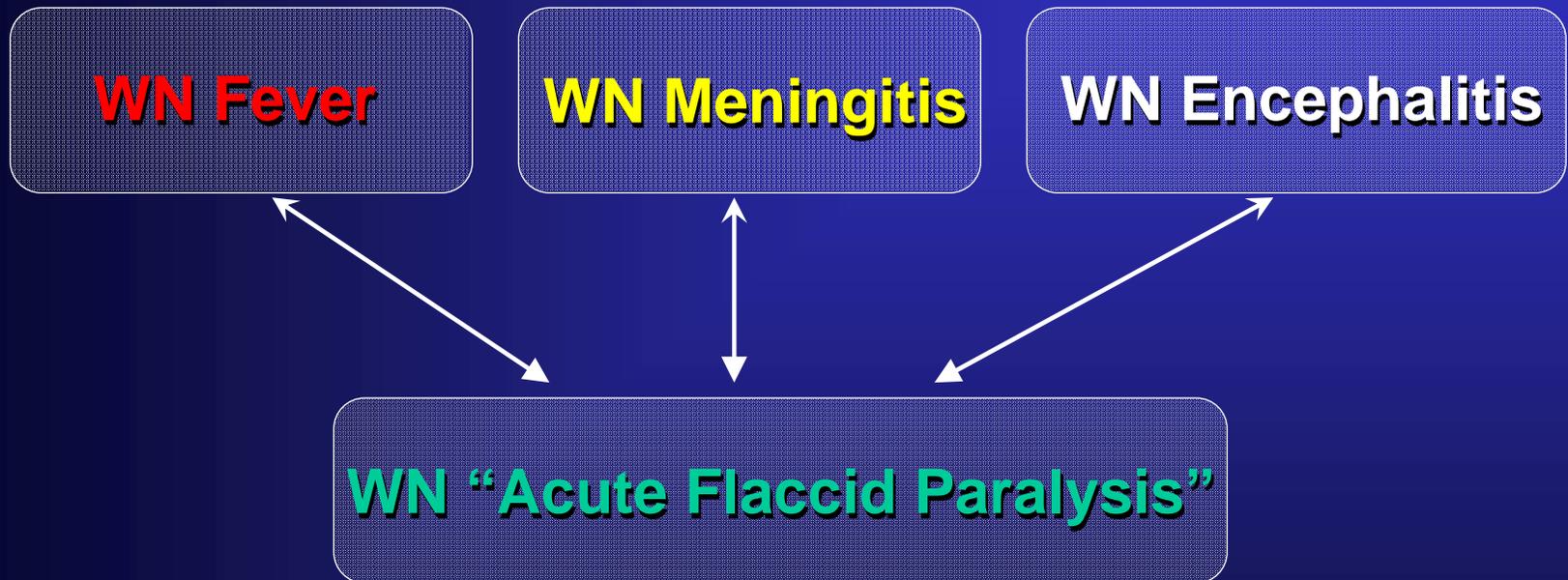
~10% fatal
(<0.1% of total infections)

~20%
“West Nile Fever”

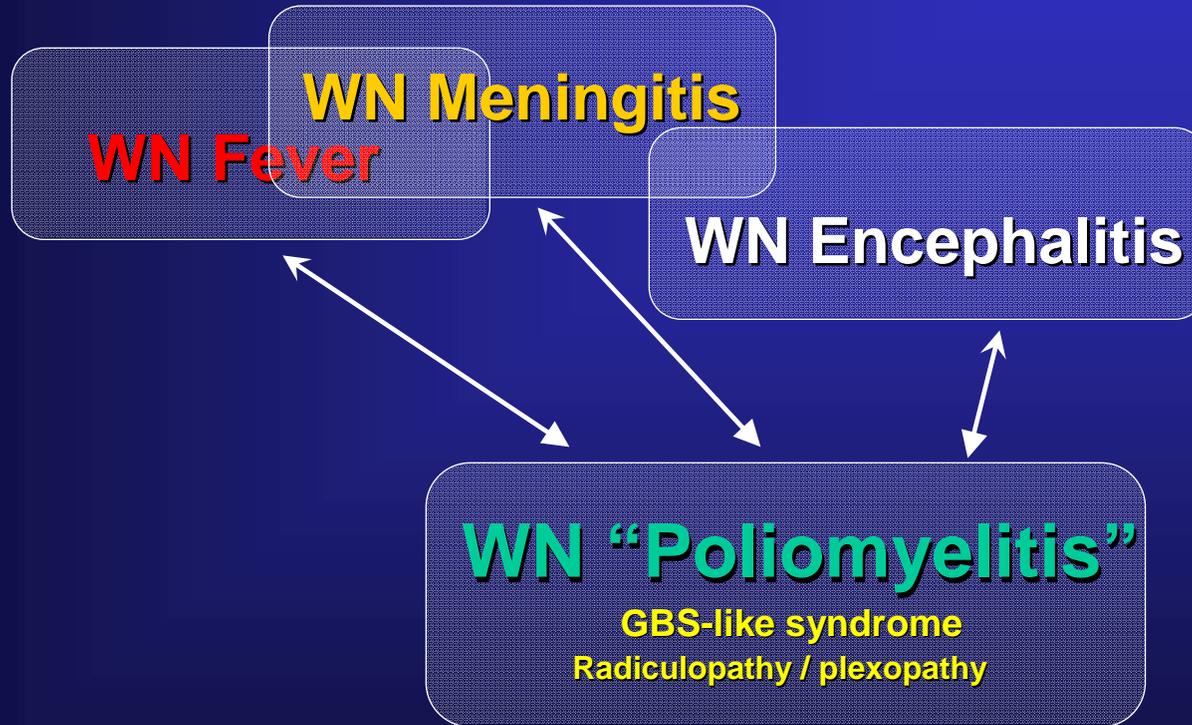
Crude estimates

~80%
Asymptomatic

Clinical Spectrum of WNV illness



Clinical Spectrum of WNV Illness: Revised



West Nile virus—Clinical and Functional Outcomes

- **WN Fever**
- **Severe Neurologic Illness Categories**
 - **Meningitis**
 - Fever, nuchal rigidity, CSF pleocytosis
 - **Encephalitis**
 - Alteration of mental status or focal neurologic findings
 - **Acute flaccid paralysis**



What happens months / years after acute illness?

West Nile Fever

- Majority of symptomatic infections
- Abrupt fever, headache, myalgias, fatigue
- Nausea, vomiting—may lead to dehydration
- Transient macular rash
- **“Mild”** febrile illness? Resolution in ~1 week?

WN Fever--Outcomes

- **Watson et al. (Ann Intern Med, 141; 2004)**
 - **Long-term functional outcome of 98 patients with WN Fever during 2002 epidemic**
 - **Fatigue (96%), headaches (71%), concentration problems (53%) common persistent symptoms**
 - **63% self-reported persistent symptoms at 30 days; median duration of symptoms 60 days**
 - **30 hospitalized (median stay: 5 days)**

WNV—Neuroinvasive Disease

- **Elderly, immunocompromised—higher rates of neuroinvasive disease, worse outcome**
 - **Independent risk factors unknown**
- **CFR 10 – 20% of most severe illness**
- **Pepperell et al., CMAJ 168(11), 2003**
 - **28% of 47 patients discharged home to independent living**
 - **79% with persistent neurologic deficits at 30 days**
- **Prospective data, Louisiana 2002 (n=16)***
 - **Persistent difficulties in 14/15 at 8 months**
 - **Persistence of tremor, parkinsonism in 45%**

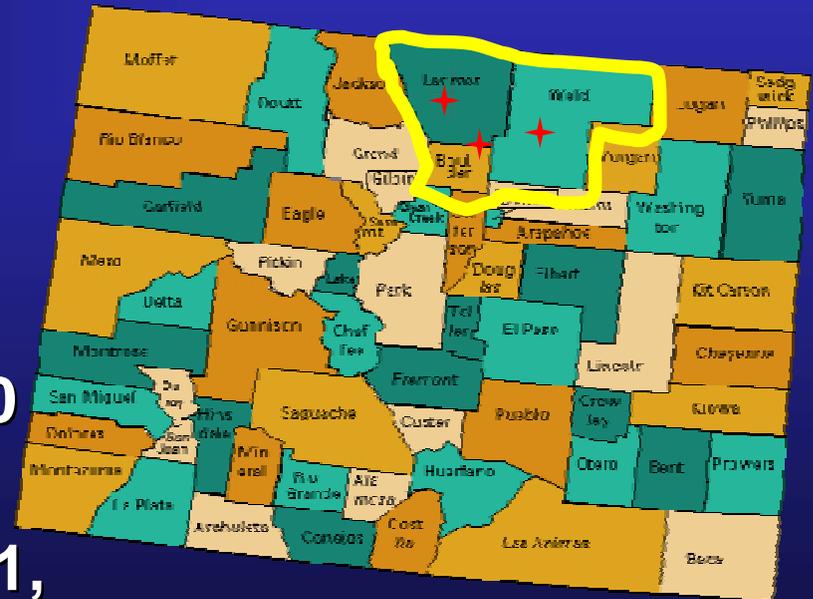
*Sejvar et al., JAMA 290(4), 2003

WNV—Outcomes Following Hospitalization

- Klee et al. (Emerg Infect Dis, 10(8), 2004)
 - 42 patients hospitalized during NYC 1999 epidemic
 - Telephone interviews at 6, 12, 18 mos
 - 37%--full recovery by 12 months
 - Self-reported fatigue, irritability, headaches, concentration problems frequent
 - Persistent illness frequently reported

WNV “Poliomyelitis”—Long-term Outcomes

- Summer 2003: northern Colorado
- 27 persons with WN poliomyelitis identified through state-based surveillance
- Attack rate: 3.7 / 100,000
- Detailed neurologic exams and interview at 1, 4, 12 months

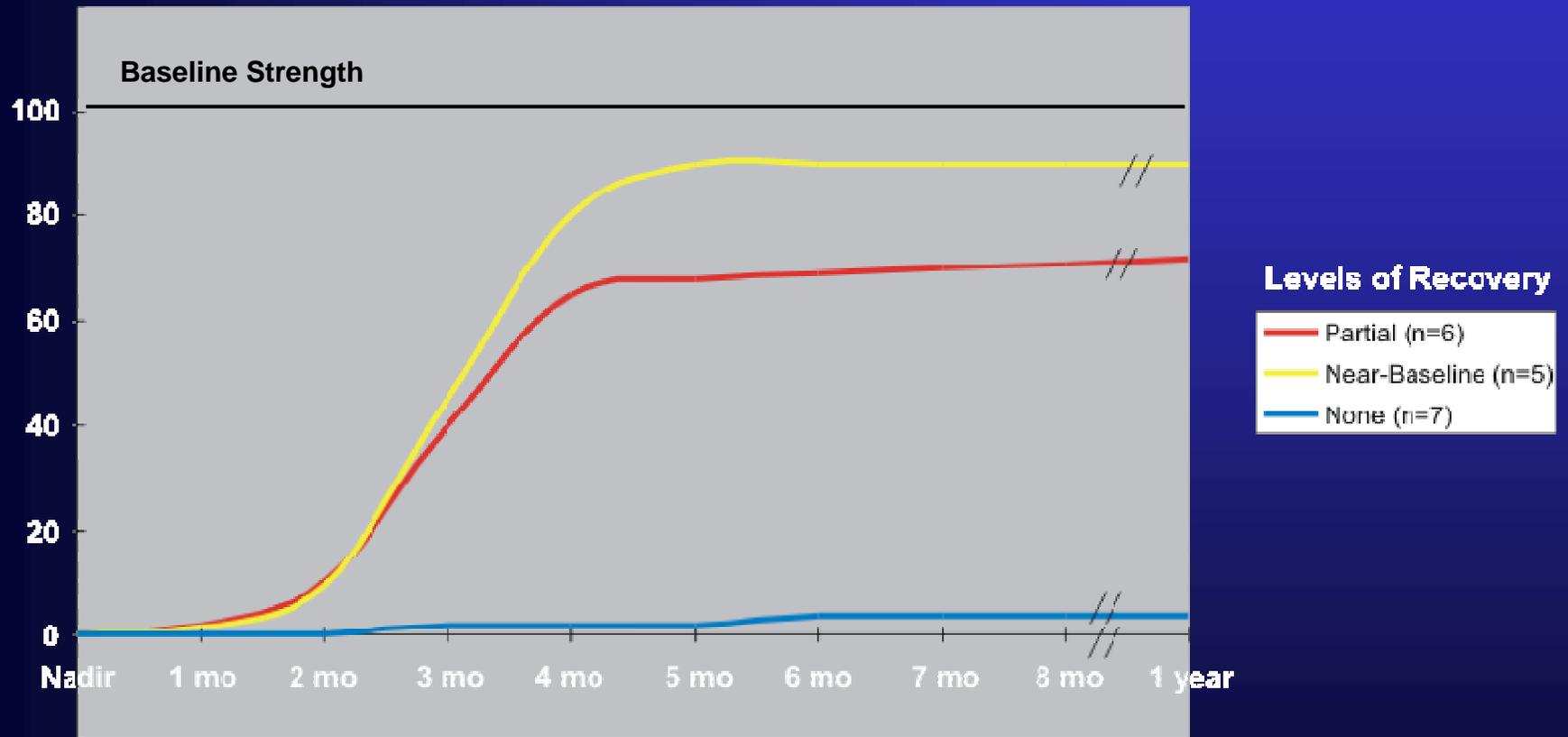


WNV-Associated “Poliomyelitis”— 1-Year Follow-Up

- 18 of original 27 re-evaluated at 1 yr
 - 6 deaths
 - 3 lost to follow-up
- Range of outcomes
 - 5: baseline or near-baseline strength
 - 6: “significant” improvement (>1 increment improvement on MMT* in affected limbs)
 - 7: little or no improvement
- Less profound initial weakness with better outcome

*Manual muscle testing using Medical Research Council 1 – 5 scale

Temporal Profile of Recovery—WNV “Poliomyelitis”



WNV-Associated “Poliomyelitis”— Respiratory Paralysis

- Original 2003 cohort: N=11
- At 1 year:
 - 6 deaths (CFR 55%)
 - 4 -- voluntary withdrawal of ventilatory support
 - No persons intubated for >4 months successfully weaned
 - 5 survivors (1 lost to follow-up)
 - 2: continued severe disability—wheelchair-dependent, supplemental oxygen
 - 2: dramatic recovery—functionally independent, back to work
 - Both <45 yrs, previously healthy
 - No other predictors of favorable outcome identified

WNV Illness Outcomes—Future Issues?

- Persistent neurocognitive sequelae
 - Subcortical cognitive deficits?
 - Objective, measurable neurocognitive dysfunction?
- Persistent parkinsonism?
- “Post-polio” syndrome?

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